

Nutrient Working Group

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Background:

Water quality in Iowa is and has been adversely impacted by a combination of point and nonpoint sources. Iowa's landscape is the most changed by man of any of the States, and Iowa has the greatest percentage of its land used for farming. The nutrient impacts to water result from the Iowa's intensive feed, food and fiber production systems have developed over a number of years and it is unrealistic to expect mitigation of those impacts in a short time horizon. Reducing the impacts of the primary nutrients of concern – nitrogen and phosphorus - to achieve improved water quality will require all stakeholders, including federal, state and local governments and the citizens of the State of Iowa, to commit to an unprecedented effort and to commit unprecedented financial resources. Agriculture, is a major contributor to nutrients in Iowa's waters, particularly nitrogen, and must be a leader in this effort.

Nitrogen and phosphorus use in Iowa has remained relatively constant for the past 15 years. During the same period, crop yields have increased significantly showing that nutrients are being used more efficiently by Iowa farmers. However, during the same period the frequency of high concentrations of nitrate-N in Iowa's rivers and streams has increased and phosphorus levels remain high in Iowa's lakes. A significant portion of this response can be attributed to hydrology, water management and changing precipitation patterns. Observations of water quality across Iowa suggest that this problem is complex and solutions will require creativity across all sectors of the Iowa landscape, both rural and urban.

There has been extensive information compiled on water quality responses of specific agricultural practices. These observations demonstrate that Iowa's farmers can improve water quality while maintaining, or perhaps even enhancing, average crop yields. For example, there is evidence that nitrogen rates applied to corn in a typical Iowa corn-soybean rotation system could be reduced without adverse impact on crop yield in an average year. However, this evidence has not been communicated to and/or "proven" to a large portion of the Iowa farming community, and it must be recognized that farmers presented with such information are also dealing with contrary signals focused on increasing yields, for federal farm program and for other financial reasons.

The Nutrient Working Group has considered many options in the development of recommendations that would improve both nutrient use efficiency and environmental quality. The goal of this document is to promote discussion that will result in implementation of practices that enhance Iowa's agriculture and its contribution to a viable economy and enhanced environmental quality.

Guiding Principles for the Nutrient Work Group:

- Nutrients (nitrogen and phosphorus) are critical to Iowa's agricultural economic base.
- There are adverse economic effects to Iowa producers when nutrients are lost from fields and these lost nutrients also have detrimental environmental effects on Iowa surface waters and the Mississippi/Missouri watersheds.

- Nutrient management decisions occur at the field and farm scale, made by individual decision-makers (farmers). The aggregate environmental impact of individual decisions is detected at the watershed scale.
- Individual decision-makers (farmers) must be convinced that voluntary adoption of practices to reduce nutrients in Iowa's surface waters is in their best interest, both economically and for sustainability. Though this is time consuming and initially expensive to implement, any other method is unlikely to achieve desired outcomes.
- Targeted efforts in watersheds and areas within watersheds will yield significant lowering of nutrient output from changes in field and landscape management.
- To successfully implement desired changes in decision making will require both accurate assessments of the scope, nature, and source(s) of the problem, and the development of performance-based criteria linked to measurable agronomic, economic, and environmental endpoints.
- Research findings must be a guiding force in developing environmental quality programs and policy.
- Achieving solutions on nitrogen focuses primarily on agricultural sources and phosphorus on both agricultural and non-agricultural sources.
- The ability of public and private organizations, from the federal government to local agribusiness and county and drainage district associations, to support and coordinate activities in watersheds is critical to the success of these efforts.
- Linkages and citations of data to guide programs and policies is a critical foundation for environmental quality programs.
- Existing and emerging research and demonstration efforts form a foundation for future success of local and statewide nutrient management efforts.
- Hydrologic changes are impacting the nutrients in our streams: both total flow and base flow have increased substantially over the past century.
- Ground water and surface water are interconnected and solutions will impact both.

Goals:

The goal is to implement soil, water and nutrient management in watersheds to reduce nutrient losses from Iowa's farm and urban landscapes to show:

- (a) Continuous improvement towards a reduction of nitrogen loading to the Mississippi and Missouri river systems by one quarter (25%);
- (b) Continuous improvement towards a decrease in the frequency and duration of daily exceedances of the 10 mg/l nitrate-nitrogen drinking water standard in Iowa's rivers designated for drinking water; and
- (c) Continuous improvement towards a reduction of phosphorus loading from watersheds to Iowa's lakes and reservoirs by one third (33%).

The outcomes will be evaluated every five years to determine progress and make adjustments to implementation steps, as necessary, to achieve the goals.

Implementation Steps:

To achieve this goal over a number of years requires an effort at the field and watershed levels. The implementation steps will require targeting resources strategically towards regions and tactically towards specific problems. The criteria for demonstrating achievement of the tasks are the changes that occur in water quality over a number of years and the sustained positive trend in improvement.

A. Field/Site Scale

1. Reduce loss of nutrients by increasing the adoption of conservation tillage practices on fields by 20% by 2010 and by 40% by 2015 compared to 2000 estimates available through Conservation Technology Information Center (CTIC). Conservation tillage is defined as practices that enhance carbon storage, decrease mineralization of nitrogen, and modify hydrology in the soil profile.
2. Increase the percentage of Iowa's producers that participate in and complete seasonal performance evaluations documenting current management systems and opportunities to improve agronomic and economic performance, and reduce risk, with a target of 30% of Iowa producers doing so by 2010 and 50% of Iowa's producers doing so by 2015.
3. Develop watershed-based field research and demonstration networks for producers to obtain information on the role of soil and water management practices (tillage, nutrient management, manure management) on environmental quality response in each major land resource area (MLRA) of the state by 2010.
4. Develop research and demonstration sites for urban communities to obtain information on the role of nutrient and water management practices by 2010, helping such communities to comply with the Federal Clean Water Act.

B. Watershed Scale

1. Develop additional locally-led and recognized infrastructure for the assessment of water quality and quantity problems and identification and implementation of potential solutions on 50% of Iowa watersheds by 2015.
2. Actively promote stream buffers with woody and deep-rooted perennial vegetation on perennial and ephemeral streams to reduce bank erosion and phosphorus movement, and improve wildlife habitat especially in streams leading to Iowa lakes.
3. Establish watershed-based districts to assess, evaluate, and implement water quality goals and progress on 50% of watersheds by 2020 and 100% of watersheds by 2030.
4. Implement long-term strategies to develop agricultural systems design and support of educational and infrastructure resources to watershed-based districts by 2015.
5. Evaluate outcomes of federal and state agricultural and natural resource protection programs on water quality.
6. Synchronize federal farm program goals with water quality goals.

In addition to the implementation steps above there are a number of critical steps needed to facilitate the achievement of the stated goals.

1. Empower representatives from the Governors water summit to formulate an action plan for the recommendations of the water summit and propose policy and program reform.
2. Develop a federal/state/local infrastructure that enables watershed-based efforts to support more efficient farming practices and environmental quality.

3. Revise standard nutrient recommendations for nitrogen and phosphorus in a “user-friendly” package to reflect current research by not later than December 2005.
4. Prepare and disseminate educational materials by December 2005, for training on “user-friendly” soil and nutrient management packages. Immediately implement practices and evaluate outcomes in demonstration cooperatives and on farms.
5. Develop a comprehensive database of natural resource and farming system information for easy access and use by watershed projects by 2006.
6. Implement Federal Clean Water Act requirements for manure from concentrated animal feeding operations to be applied considering both nitrogen limits and the Iowa Phosphorus Index by not later than December 2006.
7. Use voluntary efforts, education, demonstration programs and federal farm conservation program efforts to implement the use of buffer strips, wetlands and water management structures in Iowa, particularly focused on drainage tile outflows, as management options for watershed implementation.
8. Provide the resources (financial and technical) to support stakeholder-based watershed associations in at least 50 10-digit hydrologic unit code (HUC) watersheds by 2008, and in at least 200 by 2020, as part of the District framework.
9. Seek special federal designation from the United States Environmental Protection Agency and from the United States Department of Agriculture for a federal pilot project targeting nitrogen reduction efforts. The targeted funds would be used to coordinate watershed efforts to reduce nitrogen in surface waters as part of the Mississippi River basin.
10. Establish permanent surface and ground water monitoring programs operating on a continuous and coordinated basis.
11. Establish a nutrient strategy for the state (as authorized in SF2293) including nutrient standards as required by EPA.

Measurements of Success:

1. Decrease the frequency (number of days per year) that nitrate levels exceed the USEPA maximum contaminant level for drinking water (10 mg/l as N) in Iowa rivers designated for drinking water.
2. Continual trendline decrease in the annual average N and P loads in the waters of the state.
3. Increase in statewide annual nitrogen use efficiency, as measured by pounds of nitrogen used to produce Iowa's total corn crop.
4. Decreased statewide average erosion and sediment loss, as measured by NRCS in fields and watersheds across Iowa.

5. Increased soil quality across Iowa fields as determined by a soil management framework.
6. Increase in the number of functioning watershed-based Districts for water and nutrient/water quality management and the increase in adoption rate of practices within a watershed

Educational Needs/Demonstration Projects:

Educational needs, including specifically demonstration projects, are tools to assist in the rapid and uniform adoption of the Implementation Steps that have been established to achieve stated goals.

1. Establish a minimum of 4 “paired” watershed studies at the 12-digit HUC scale to document and demonstrate the impact of field and watershed management practices. The paired watersheds would be similar in size and land uses, with one watershed adopting Implementation Steps and the other not adopting such steps. This demonstration project would begin in 2005 and continue until 2009.
2. Add qualified and trained watershed water quality specialist positions to provide infrastructure for training and educational efforts.
3. Establish and fund water quality/water management/water monitoring certification programs at Iowa’s community colleges.
4. Develop an infrastructure for watershed associations to compare results and experiences each year with the emphasis on comparing the impact of implementation on water quality and innovative farming practices.
5. Develop a targeted media campaign to producers and the public stressing the importance of soil and nutrient management in assisting Iowa in achieving its water quality goals
6. Expand educational and demonstration programs for water quality and water management at 4-H and FFA chapters.

Financial Resources:

Financial resources pay for the Implementation Steps and for the educational needs/demonstration projects that are to be put in place to achieve stated goals.

1. Utilize current federal, state and local funding, particularly full funding of the Conservation Security Program in the 2003 federal farm bill, to facilitate the Implementation Steps outlined above
2. Seek additional, specific, funding for an Iowa-based nitrogen reduction strategy.

Social and Economic Impacts:

Social and economic impacts are projected quality of life and economic improvements and costs that may result from achieving the stated goals.

1. Improving water quality in Iowa would enhance the quality of life of Iowans (ie., fishing and recreation opportunities), will support efforts to increase tourism and will support Iowa's economic development efforts.
2. Building community and neighbor relations by involving all interested stakeholders in watershed-based efforts to manage water and to reduce nutrient flows from watersheds.
3. Increasing land uses in buffers and other nutrient management strategies will increase fish, game and fowl populations, supporting Iowa's hunting and fishing industries and improved quality of life.
4. Improved nutrient management and water management will make Iowa's crop and livestock sectors more environmentally sustainable over a long time horizon.
5. Different crop usage patterns used to manage nutrient use may provide for new opportunities for Iowa farmers, and may also adversely impact those farmers to the extent federal farm program or other payments are based on yield histories from fields.
6. Changed nutrient practices will require affected industries to adapt to such changes.
7. Reduced nitrate (nitrogen) levels may avert the need for costly systems for the removal of nitrates from drinking water supplies.
8. Changes in nutrient, soil and water management systems will create opportunities to reward individuals, service providers and communities that implement and successfully adapt to such changes.

Members of the Nutrient Work Group for the Iowa Water Summit:

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